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Improving the Quality and Marketing of Domestic Fleece Wool

GENE E. MURRA

G. F. HENNING

M. G. SMITH

OHIO AGRICULTURAL EXPERIMENT STATION - - WOOSTER, OHIO

In Cooperation With
Marketing Economics Division, Economic Research Service
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INTRODUCTION

Wool produced in Ohio and in the rest of the fleece wool area of the United States faces severe competition from other sources. The important sources are wools imported from wool surplus-producing countries and from man-made products, such as rayon. Ohio wool producers and marketing agencies handle wool much as they did 60 to 80 years ago; they have made little progress in meeting this competition.

Domestic fleece wool generally receives little preparation, except for grading, before it reaches the textile mill. Thus, it is often marketed in a non-uniform, low-competitive condition when compared with foreign wool.

Competition from uniform foreign wools and man-made fibers has been further enhanced by recent developments in the woolen fabric manufacturing trade. New blending and modern machinery has been added which replaced old equipment. This makes a higher quality, more uniform wool product to compete with non-wool products. Domestic wool often does not possess the desired quality; therefore, foreign wools or man-made fibers are used.

One approach to increasing the competitive position of domestic wool is through improvement in its preparation before it reaches the textile mill. Past research on the feasibility of performing certain quality-improving procedures on domestic wool has been limited, and what has been done has been largely confined to the territory wool area.

The production of fleece wool is different from that of territory wool; research results are not always mobile from one area to another. For example, the average flock size in Ohio in 1959 was only 43 head, while for the United States as a whole the average was 99 head per flock. The average flock size in the territory wool regions ranged from a low of 160 head per flock in the Pacific region to a high of 372 head per flock in the Mountain region. The percentage of large flocks (over 300 head) was also greater for the territory wool regions than for the fleece wool regions (Table 1).

TABLE 1.—Average Number of Sheep and Lambs on Hand for Farms Reporting and Percentage Distribution by Flock Sizes, United States, by Area, 1959.

Area	Flock Size							
	Under 25	25-99	100-299	300-999	1000-1999	2000-4999	Over 5000	Average Flock Size
	(Percentage of Flocks in Each Size Category)							
Primarily Fleece Wool Area								
Northeast Region	78.4	18.6	2.7	.3	0	0	0	19
Middle Atlantic Region	65.0	28.1	6.0	.9	*	*	0	33
East North Central Region	59.2	33.5	6.2	1.0	.1	*	*	37
South Atlantic Region	56.5	38.5	4.4	.5	.1	*	0	34
East South Central Region	40.8	48.4	9.5	1.2	.1	*	0	48
Primarily Territory Wool Area								
West South Central Region	41.4	26.6	17.9	9.7	2.6	1.5	.3	199
Mountain Region	36.6	24.5	18.0	11.7	4.9	3.2	1.1	372
Pacific Region	51.8	27.9	12.1	5.1	1.6	1.1	.4	160
Includes Both Fleece and Territory Area								
West North Central Region	43.8	39.4	12.9	3.3	.5	.1	*	73
United States	49.6	34.3	10.8	3.7	.9	.5	.2	99
Ohio	49.4	40.6	8.9	1.0	.1	*	0	43

*Less than .1 percent

Source: **United States Census of Agriculture:** 1959, Volume II, United States Bureau of the Census, United States Government Printing Office, Washington, D. C., 1962, pp. 558 and 562.

IMPORTANCE OF WOOL INDUSTRY IN OHIO

The decline in the importance of the wool-producing industry is brought out in Figure 1. The value of Ohio wool dropped from a high of 6.3 percent of the value of all United States wool production in 1935 to a low of only 2.9 percent in 1961. Income from wool in Ohio as a percentage of Ohio farm income from all sources has also declined. Wool accounted for 2.1 percent of all Ohio farm income in 1933, while in 1961 it accounted for only 0.3 percent.

Although the importance of the wool-producing industry has certainly declined in the last three decades, many farmers in Ohio continue to maintain a sheep enterprise. The following reasons sum up the benefits of the sheep enterprise on Ohio farms:

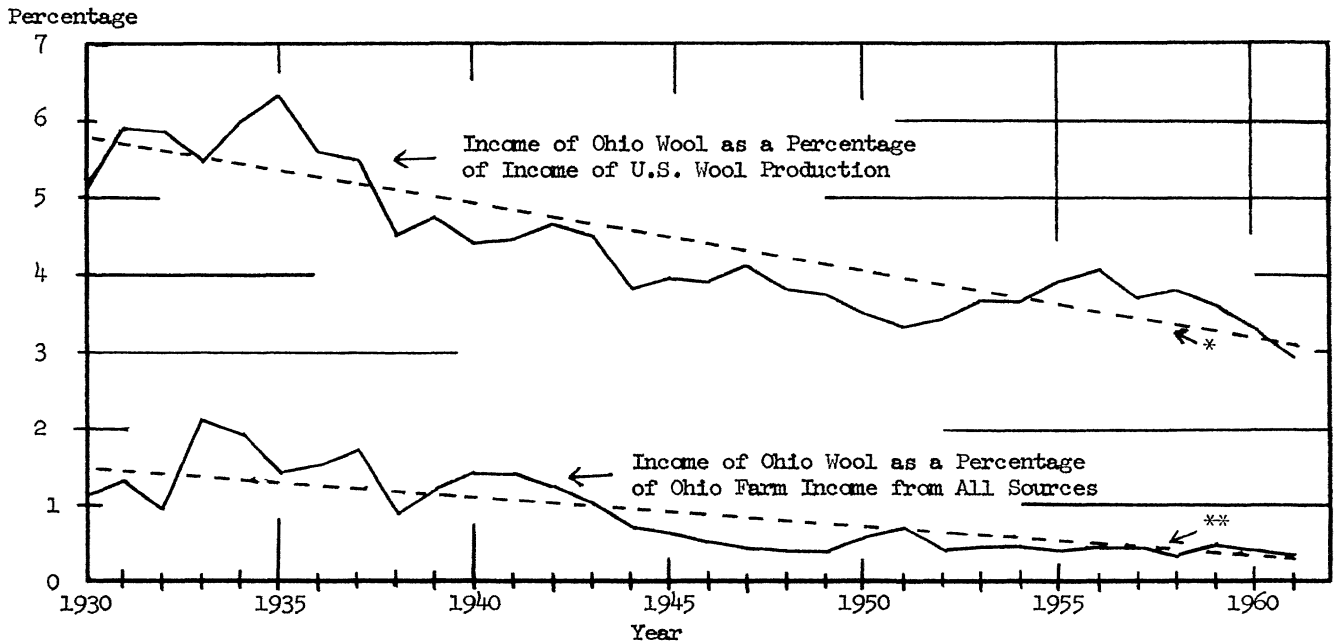
1. Labor may be more fully utilized throughout the year.
2. Feed used by sheep, especially unharvested crops or weed growth, may be wasted or not used as profitably by other livestock.
3. The overhead expenses of a small sheep enterprise are relatively low.
4. The enterprise gives the farmer more diversification, as he may market wool, mutton, or both during the year.

The sheep enterprise is usually carried on a supplemental basis on Ohio farms. This means that labor, capital, or management factors put into the sheep enterprise are not taken away from some other enterprise, but rather, they are factors which might be wasted if they were not used on the sheep enterprise. This also means that wool is usually marketed with a minimum of handling. Little is done to the wool itself to improve its quality. The low monetary returns to the small flock owner do not justify any added efforts.

QUALITY IMPROVEMENT AT THE FARM LEVEL

Although the small scale of the wool enterprise on most farms in Ohio hinders a more extensive wool quality improvement program at the farm level, there are practices which the individual farmer might adopt which could improve wool quality and yet not increase his costs. He might:

1. Follow a selection or improved breeding program which produces a single or more uniform grade of wool.
2. Segregate sheep according to their wool characteristics at time of shearing if several types of sheep are found in the same flock.
3. Follow a sound shearing program, using qualified shearers and a clean shearing area.



* Trend Line y=5.761 - .0857x
**Trend Line y=1.522 - .0404x

Fig. 1.—Income of Ohio wool as percentage of income of U. S. wool production and of Ohio farm income from all sources, 1930-1961.

4. Market wool soon after it is sheared, or at least store wool in a clean, dry place, reasonably free from dirt and dust.
5. Learn more about his product so he can be in a better bargaining position when selling his wool.
6. Market wool where a premium is paid for high quality wool and low-quality wool is discounted, rather than where an "average" price is paid for all wool.

QUALITY IMPROVEMENT AT THE WAREHOUSE LEVEL

The above practices could improve the quality and returns of an individual farmer's clip. However, the small scale of his wool enterprise limits the extent of work which he can profitably perform on his wool. The wool warehouse or wool collecting point, with larger quantities of wool, might be able to employ quality-improving techniques not applicable at the farm level.

An exploratory study in Ohio in 1959 indicated that warehouse sorting of fleece wool for market might be economically feasible.[1] However, the amount of wool sorted was small (about 35,000 pounds) and it was recommended that the scale of the study be expanded before such a program affecting many farmers be adopted. Since this alternative appeared to be economically feasible as well as one to which research could be applied, it was chosen as the basis for this study.

OBJECTIVES AND PROCEDURES

In line with the above comments, the following objectives were established for this research:

1. To study and develop alternative techniques of preparing fleece wool for market in the producers' warehouse.
2. To evaluate these alternatives in terms of their applicability in the wool marketing field, in terms of costs and returns, and in terms of their acceptability by wool handlers.

To accomplish the above objectives, the cooperation of the Ohio Wool Growers' Association was obtained. Based upon previous research, comments from personnel of the Ohio Wool Growers' Association, and recommendations of wool buyers, the following alternatives were developed and analyzed:

1. Grading of wool in the warehouse.
2. Grading wool for felting.
3. Sorting of uniform lots of graded fleece wools.

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[1]Newberg, Richard R, and McDonald, Russell F., "Costs and Returns from Sorting Fleece Wool for Market in the Producer's Warehouse," **Research Bulletin No. 883,** June, 1961, Ohio Agricultural Experiment Station, Wooster, Ohio.

4. Sorting of mixed lots of graded fleece wools.
5. Sorting of tags or offsorts.

These alternatives were then tested at the Ohio Wool Growers' Association in Columbus, Ohio.

Grading Wool in the Warehouse

Wool grading was used as the control alternative in this study. That is, all costs and returns for the other alternatives were compared to those associated with normal grading. The grading procedure used by the Ohio Wool Growers' Association was a fairly typical one. One professional grader and two helpers sorted or graded the wool according to the marketing practices of the wool industry. Grading costs averaged about one cent per grease pound of wool handled at the warehouse, seven-tenths of a cent per pound for labor, and three-tenths of a cent per pound for overhead expenses. Conveyors were not used because of the problem of maintaining consignor identity until after the wool was graded.

Grading for Felt-Style Wool

Grading for felt-style wool, as used in this study, is a revision of the normal grading operation. An additional helper was added to the personnel used in the normal grading operation. The only major difference between this alternative and normal grading is that a more thorough inspection of each fleece is made. This procedure was aimed at putting up lots of wool which met specific requirements of processors. In addition to the normal grade characteristics, the grader checked for unusual strength and length within the grade. The criteria used depended upon buyer specifications.

The grading procedure varied among lots, depending upon the quality of the pre-graded lot as well as upon the requirements of the graded felt-style lots. When requirements called for relatively long-stapled fleeces within the grade, or when the pre-graded lot was relatively short, only a small percentage of fleeces was kept for felt-style wool. For example, in filling an order for ¼ blood felt-style wool, all fleeces with a staple length of less than 4.25 inches might be rejected. The percentage of fleeces rejected or accepted thus depended upon the fiber length of the lot being handled. If a shorter staple length was acceptable, or if the pre-graded lot was made up of relatively long-stapled fleeces, a high percentage of the fleeces was kept for felt-style wool.

Between 15 and 30 percent of the fleeces were sorted out of the lots analyzed in this study. Fleeces sorted out had either very short staple length or had some other undesirable characteristics, such as excessively stained, seedy, or burry wool.

Duties of the personnel did not change greatly from what they had been in grading. The grader made a more detailed inspection than when he was doing normal grading. The additional helper trucked the felt-style fleeces (or the "off-sort" fleeces) from the grading table to the storage area, or he assisted the other helpers in preparing fleeces for the grader. The only additional costs above normal grading costs were for labor.

Almost 1 million pounds of wool were handled under this alternative. Average returns for the 24 lots were 2.03 percent above returns expected from normally graded wool. Net returns above normal grading were 2.64 percent, 1.92 percent, and 2.04 percent for the low 1/4 blood, 1/4 blood, and 3/8 blood lots, respectively (Table 2) . Thus, from a cost and return standpoint, this alternative was definitely profitable for the warehouse.

Sorting Uniform Lots of Graded Fleece Wool

Sorting uniform lots of graded fleece wool involved a completely different procedure from the normal grading operation. The following steps were required for this alternative in addition to normal grading:

1. Movement of graded wool to the sorting table.
2. Preparation of wool for sorting, such as cutting and removing twine or strings.
3. Picking up and shaking out the untied fleeces.
4. Sorting out tags, stained wool, or burry and seedy wool.
5. Sorting out the next higher and lower grades of wool from the fleece.
6. Movement of the various sorts to the storage or bagging area.

The purpose of this sorting procedure was to provide a lot of wool that had reasonable uniformity of the physical characteristics of a particular grade of wool. Figure 2 shows a typical yield from a graded 3/8 blood fleece.

Three workers made up the labor force for the sorting operation, a professional grader and two helpers. However, as the operation continued only one helper was used. The grader made the various sorts on the individual fleeces. At first, one helper untied each fleece and placed it on the sorting table while the other helper removed and emptied the wool carts and containers as they were filled from the sorting table area to the storage area. He also bagged the main sort. Later in the study, only one helper was used, as wool was assembled and removed only twice daily, rather than one cart at a time. Also, the main

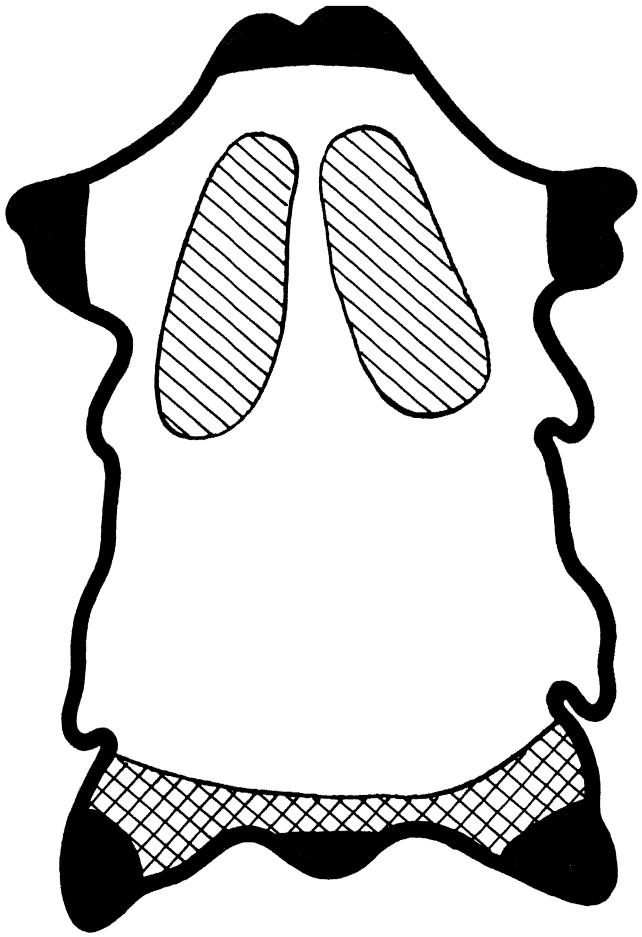
sort was not bagged until the end of the day or whenever sufficient volume was accumulated.

The only additional equipment required was a 4 x 8 foot sorting table with a 3-foot square opening in the center. This opening was covered with a ¾-inch square hardware cloth to allow foreign materials to fall out of the fleece as it was shaken prior to and during sorting.

TABLE 2.—Net Returns To Felt-Style Sorting, Ohio Wool Growers' Association, Columbus, Ohio, 1959-62[1]

Wool Grade	Grease Weight	Net Returns Above Original Graded Value	Net Returns Per Grease Pound of Graded Wool
	(Pounds)	(Percent)	
⅜ blood	36,592	3.02	$ .014
	35,775	2.50	.015
	26,742	4.04	.023
	67,881	3.21	.018
	64,237	.64	.004
	49,502	3.15	.017
	51,083	2.35	.013
	73,339	1 79	.010
	75,000	.41	.003
	47,500	1.90	.011
Total ⅜	527,651	2.04	$ .012
¼ blood	34,465	3.44	$ .016
	14,788	2.55	.014
	29,900	2 23	.012
	34,940	2.71	.015
	10,800	2 27	.014
	19,635	2.40	.014
	38,064	1.16	.007
	17,080	2.31	.014
	58,086	.83	.005
	24,816	2.60	.015
	68,750	1.50	.009
Total ¼	351,324	1.92	$ .011
Low ¼ blood	40,800	2.45	$ .011
	2,064	2.90	.017
	19,752	2.95	.016
Total low ¼	62,616	2.64	$ .013
Total Felt-style	941,591	2 03	$ .011

[1]Net returns refer to receipts above the graded value. Additional costs above normal grading were deducted.



KEY		APPROXIMATE PERCENTAGE
■	OFFSORTS (TAGS, GRAY, SEEDY, BURRY)	7%
▨	3/8 BLOOD WOOL	16%
▩	LOW 1/4 BLOOD WOOL AND BABY COMBING WOOL	5%
□	1/4 BLOOD WOOL	71%
	OTHER (STRING, FOREIGN MATTER)	1%
		100%

Fig. 2.—Typical yield from a graded three-eighths blood fleece.

TABLE 3.—Sorting Costs for Wool Lots Prepared under Alternative Number Three, Ohio Wool Growers' Association, Columbus, Ohio, 1959-62

Lot Number	Period On Which Charges Based	Interest Charge	Storage Charge	Labor Cost	Total Sorting Cost
	(Months)				
1	2.0	$179.93	$106.63	$793.28	$1079.84
2	2.0	204.51	122.28	832.64	1159.43
3	1.5	48.48	27.34	296.32	372.14
4	2.5	240.92	154.94	815.90	1211.76
5	1.5	54.09	34.36	291.10	379.55
6	1.0	15.98	10.36	114.80	141.14

The costs incurred in completing the sorting process described above in addition to those normally incurred in grading were: (1) wages paid to the professional sorter and his helper, (2) a storage charge made on wool which was sorted, and (3) an interest charge made to cover the value of the wool "tied-up" during sorting. These charges are shown in Table 3.

The first two lots prepared under this alternative used two helpers in addition to the sorter. The last four lots required only one helper. The average amount of wool handled dropped from about 296 pounds per hour with two helpers to about 255 pounds per hour with one helper. With one less worker to pay, however, labor costs per pound of wool handled declined from $.017 per pound to $.016 per pound (Table 4).

TABLE 4.—Net Returns to Sorting Six Uniform Lots of Graded Fleece Wool, Ohio Wool Growers' Association, Columbus, Ohio, 1959-62.

Lot Number	Gross Returns Above Original Graded Value	Sorting Costs	Net Returns Above Original Graded Value	Net Returns (Percent of Original Graded Value)
1 (1/4 blood)	$1037.92	$1079.84	—$ 41.92	— .16
2 (1/4 blood)	1803.10	1159.43	643.67	2.10
3 (3/8 blood)	430.75	372.14	58.61	.63
4 (1/4 blood)	937.79	1211.76	— 273.97	— .95
5 (1/4 blood)	171.80	379.55	— 207.75	—1.92
6 (3/8 blood)	149.46	141.14	8.32	.17
Total	$4530.82	$4343.86	$186.96	.16
Total (1/4 blood)	$3950.61	$3830.58	$120.03	.12
Total (3/8 blood)	$ 580.21	$ 513.28	$ 66.93	.48

The difference of only one-tenth of a cent per pound in labor costs between crews with one helper or two helpers was not considered significant, as there were greater differences in labor costs per pound for lots sorted by the same size crew.

Average net returns above graded value were 0.16 percent for the six lots tested. The ¼ blood lots, about 166,000 pounds, averaged a 0.12 percent net return above graded value, while the ⅜ blood lots, about 24,000 pounds, averaged 0.48 percent net returns above graded level (Table 4).

Thus, this alternative appears to offer little incentive, from a monetary viewpoint, to the warehouse.

Sorting Mixed Lots of Graded Fleece Wool

The same general sorting procedure used above was applied to three mixed lots of graded fleece wool. The only basic difference between the two alternatives was in grade and quality of wool handled.

Under this alternative, several grades of wool were handled in each lot rather than only one grade. Also, wool of lower quality was often handled, such as number two wool, lamb's wool, low ¼ wool, mothy wool, baby combing wool, and small amounts of pulled wool. Duties of the sorter and his helper did not change from the previous alternative, and labor costs were high. However, as wool handled under this alternative was often wool left over at the end of the normal marketing period, it did not have to be held back to allow time for sorting. Thus, storage and interest charges were not deducted from receipts from wool prepared under this alternative.

The net returns above sorting for this alternative averaged 1.60 percent above graded value. The net returns for each of the three lots were 0.61 percent, 0.42 percent, and 2.84 percent, respectively.

Since this alternative yielded a higher net return than the previous alternative, it appears to offer more incentive at the warehouse level than sorting uniform lots (Table 5).

Sorting of Tags

The final alternative tested was sorting of tags. Two sorters and one helper performed the operation. The sorters handled the wool, picking out any wool which could be sold at "higher than tag" prices. The helper then bagged the grades obtained and moved them to the storage area.

About 30 percent of the 3,823-pound lot was sorted out, either as medium seedy and burry wool or as medium baby combing wool. The remaining 70 percent was still classified as tags. As wool sorted out

TABLE 5.—Net Returns to Three Mixed Lots of Wool Prepared under Alternative Number Four, Ohio Wool Growers' Association, Columbus, Ohio, 1961-62.

Lot Number	Total Graded Weight	Gross Returns Above Original Graded Value	Sorting Costs	Net Returns Above Original Graded Value	Net Returns as Percent of Original Value
1	18,318	$ 346.72	$287.00	$ 59.72	.61
2	21,728	378.26	328.00	50.26	.42
3	36,139	1034.22	483.80	550.42	2.84
Total	76,185	$1759.20	$1098.80	$660.40	1.60

TABLE 6.—Returns for Various Grades from a Sorted Lot of Tags, Ohio Wool Growers' Association, Columbus, Ohio, 1962.

Grade	Pounds	Percent of Total	Cents per Pound[1]	Total Dollar Value
		Graded Wool		
Tags	3823	100.0	25.0	$ 955.75
		Graded and Sorted Wool		
Medium burry and seedy	656	17.20	50.0	328.00
Medium baby combing	507	13.30	54.0	273.78
Tags	2660	69.50	23.0	611.80
Total	3823	100.00	XXXX	$1213.58
		Comparison		
Gross difference				$ 257.83
Labor costs				
2 Sorters — 10 hours @ $2.65 = $26.50				
1 Helper — 5 hours @ $1.45 = $ 7.25				
TOTAL LABOR COSTS		$33 75		
Net Returns				$ 224.08
Net Returns as Per Cent of Graded Value				18.46
Net Returns per Hour of Labor				$ 14.94
Net Returns per Grease Pound of Sorted Wool				$ .058

[1]Estimated grease price based upon market price at time wool was sorted.

had a greater value than tags, higher gross receipts were obtained for the sorted lot. Even after sorting costs of $33.75 were deducted, net receipts of above original tag value were realized. This amounted to an 18 percent net return or about 5.8 cents per pound of tags handled (Table 6).

The lack of a greater supply of tags prevented further testing of this alternative. However, the high returns for the lot tested indicated that this was a profitable procedure to follow at the warehouse level, even though on a supplemental basis because of limited supply of tags.[1]

CONCLUSIONS

The importance of wool production in Ohio has declined during the last several decades, both as a percentage of total United States wool production and as a percentage of Ohio farm income. Increased competition from imported wool and from domestic man-made fibers has been a major cause of this trend.

Monetary returns to individual wool producers in Ohio are usually low because most Ohio wool is produced by small farm flocks. Thus, increased total dollar returns as a result of a wool quality improvement program at the farm level would be low. Quality improvement at the warehouse level has not yielded high returns either.

Increased returns to sorted wool are very low, especially in relation to the high labor costs involved. Since there are no standard industry specifications for sorting, it probably would be mere coincidence if the sorted wool happened to meet the processor's requirements exactly.

Although the quality of domestic fleece wool can be improved at both the farm and warehouse levels, the monetary returns are too low to create much interest by wool producers.

Techniques which improve wool quality without requiring a great deal of added labor or capital appear to offer more promise than an extensive sorting program.

[1]The reader should be cautioned that other tests may show different prices for graded and ungraded tags.

APPENDIX

GLOSSARY OF WOOL TERMS

This is a partial glossary of terms used in the wool industry. It is designed as a reference for definitions of such terms appearing in this report.

Blood — The term "blood" is used with 1/2, 3/8, and 1/4 grades to indicate degree of fineness.

Burry Wool — Wool that contains burrs from any plant.

Clean Value — Market value of the wool after all foreign matter has been removed by scouring.

Clip — The weight or type of wool from all the sheep in a particular area. May also refer to all the fleeces from a certain flock in a given year.

Domestic Wool — Wool produced in this country in contrast to foreign-produced wool.

Felt — Usually applies to material in which the wool fibers are held together by being matted or felted, without spinning or weaving.

Felt-Style Wool — As used in this report, the term refers to wool commonly known as papermaker felt. Especially long and strong fibered wool is required, as it is used to make large belts for paper mills. These belts are often 8 to 10 feet wide and 100 to 200 feet long.

Fleece Wool — A term applied to wool produced mainly east of the Missouri and Mississippi rivers, primarily by small farm flocks.

Grade (Wool) — Relates primarily to fineness, or diameter, of the fibers.

Grading (Wool) — Classifying of entire fleeces (without opening or breaking them) according to fineness and length of fiber and suitability for different mill needs.

Grease Wool — Wool as it comes from sheep.

Half-Blood (Wool) — A grade of domestic wool obtained from sheep that are half Merino blood; the equivalent of English 58's and 60's.

Lamb's Wool — Wool shorn from lambs up to about seven months old. It is softer and has higher spinning properties than wool of similar quality shorn from older animals. Lamb's wool also tends to "rise" to the surface in yarn drawing and weaving, thus giving a better appearance to the fabric.

Low Quarter-Blood Wool — Wool equivalent to English 46's in fineness.

Matchings (Wool) — The different sorts of wool into which the fleece is divided in sorting.

Mixed Lots — In this study, lots containing more than one grade of graded wool as distinguished from uniform lots which contained only one grade. Matchings from each of the several grades are combined and sold in the same way as matchings from the uniform lots.

Off-sorts — The portions or sorts of a fleece that are less valuable than the main or regular sorts in the same fleece because of paint brands, stains, and so forth.

Putting Up Wool — The preparation of raw wool for marketing either in bags or in graded piles in the warehouse.

Quality Wool — Wool having low shrinkage, i.e., no suint or manure tags, low vegetable matter content, limited off-sorts, and little coarse and short fibers.

Quarter-Blood Wool — Domestic wool of a certain degree of fineness (bulk of American 48's and 50's).

Seedy — Wool containing excessive seed and chaff.

Shearing — Removal of a fleece with shears or clippers; also applied to the removal of uneven, projecting fibers from the surface of woven or felted fabrics.

Shrinkage — Percentage of the weight of grease wool lost in scouring.

Sorting — Breaking up the individual fleeces into a number of quality lines, according to the uses to which the wool is to be put in the mill, and also according to the character or evenness of the fleece.

Staple — Territory fine combing wool is always referred to as territory fine staple. Staple properly refers to the length of the fiber, but in a more restricted sense it is used for a lock of wool in the fleece.

Staple Wools — Those that more than meet the minimum length requirements for a combing wool.

Tagging — Removal of tags from fleece.

Tags (Wool) — Wool trade term for every description of broken wool locks, and so forth, sorted from the fleece or swept from the floor of the shearing pen. Commonly refers to heavy manure-covered wool locks.

Territory Wool — Wool produced in certain western states, largely those in the Rocky Mountain area. The term originated through the fact that most of these states were important for wool growing before they were admitted to statehood.

Three-Eighths-Blood Wool — A term designating a given degree of fineness in domestic wool (56/58's quality) between low half-blood and high quarter blood. It originally was applied to wool from sheep with three-eighths of Merino blood.

Uniform Lots — Lots of wool made up of only one grade of wool.

Vegetable Matter — Various kinds of burr (some of which, as mestiza or burr-clover seed pods and needle grass, must be removed by carbonization), straw, chaff, seed, and so forth.

Wool Grades — The United States Department of Agriculture has issued 14 standards for the following grades of wool, which are recognized by law.

STANDARD U. S. WOOL AND TOP GRADEDS

Fine	80's	Quarter Blood	54's
	70's		50's
	64's		
		Low Quarter Blood	48's
Half Blood	62's		46's
	60's		
		Common & Braid	44's
Three-Eighths Blood	58's		40's
	56's		36's

Yield — The quantity of clean wool obtained from a specified amount of grease wool.